Practice Problem

PHY 131 Spring 2017

Unit V-X

1. A wave traveling along a string is described by $y(x,t) = 0.00327 sin(72.1x - 2.72t)$.

   (a) What is the amplitude of this wave?

   (b) What are the wavelength, period, and frequency of this wave?

   (c) What is the velocity of this wave?

   (d) What is the displacement y at x=22.5 cm and t=18.9 s?

2. A block whose mass m is 680g is fastened to a spring constant k is 65 N/m. The block is pulled a distance x =11cm from its equilibrium position at x=0 on a frictionless surface and released from rest at t=0.

   (a) What are the angular frequency, the frequency, and the period of the resulting motion?

   (b) What is the amplitude of the oscillation?

   (c) What is the magnitude of the maximum acceleration of the block?

3. A standing wave occurs on a string of length $L = 0.800m$ that has 5 nodes, and the waves that make up the standing wave are traveling at 3 m/s.What is the wavelength λ of the transverse waves producing the standing wave pattern, and what is the harmonic number n? What is the frequency of the transverse waves?

4. Two sinusoidal waves with identical wavelengths and amplitudes travel in opposite directions along a string with a speed of 10cm/s. If the time interval between instants when the string is flat is $0.50s$, what is the wavelength of the waves?

5. A standing wave pattern on a string is described by $y(x,t) = 0.040(sin5\pi x)(cos40\pi t)$, where x and y are in meters and t is in seconds. For $x \geq 0$, what is the location of the node with the smallest, second smallest and 3rd smallest value of x? What is the period of oscillation for the standing wave? What are the speed and amplitude of the two traveling waves that interfered to produce this wave?

6. In Fig. 1, a ball is launched with a velocity of magnitude 10.0 m/s, at an angle of 50.0 degrees to the horizontal. The launch point is at the base of a ramp of horizontal length d_1=6.00 m and height d_2=3.60 m. A plateau is located at the top of the ramp. (a) Does the ball land on the ramp or the plateau? When it lands, what are the (b) magnitude and (c) angle of its displacement from the launch point?
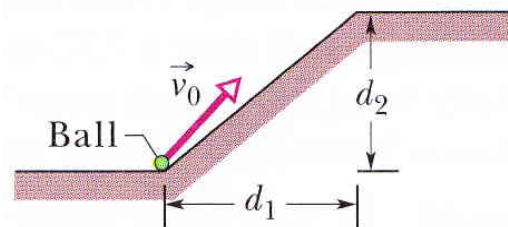

Fig. 1

7. A boy whirls a stone in a horizontal circle of radius 1.5 m and at height 2.0 m above level ground. The string breaks, and the stone flies off horizontally and strikes the ground after traveling a horizontal distance of 10 m. What is the magnitude of the centripetal acceleration of the stone during the circular motion?

8. What is the de Broglie wavelength of an electron with a kinetic energy of $1.92*10^{-17}$J?